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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/570,594

10/31/2006

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EXAMINER

PANDE, SUCHIRA

ART UNIT

PAPER NUMBER

1637

MAIL DATE

DELIVERY MODE

05/12/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/570,594	<b>Applicant(s)</b> TAKATOH ET AL.	
	<b>Examiner</b> SUCHIRA PANDE	<b>Art Unit</b> 1637	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 28 January 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 4 and 6-8 is/are pending in the application.
- 4a) Of the above claim(s) 8 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 4, 6, 7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### **Claim Status**

1. Amendment filed on January 28, 2008 is acknowledged. Applicant has amended base claim 4, by importing the subject matter of former claim 5 into claim 4; cancelled claims 1-3, and 5. Claim 8 is drawn to non elected group II invention. Accordingly claims 4, 6 and 7 are under consideration and will be examined in this action.

### ***Response to Arguments***

#### Re 102 rejection of claims 4 and 7 over Larsson et al.

2. Applicant's arguments with respect to claims 4 and 7 have been considered but are moot in view of the new ground(s) of rejection. Applicant has amended claim 4 by adding the limitations of former claim 5 into the base claim. Larsson et al. does not teach the compound of former claim 5 hence 102 (b) rejections of claims 4 and 7 over Larsson et al. is no longer valid and is being withdrawn. New grounds of rejection are being introduced using art that teaches the amended claim 4.

Re 103 rejection of claims 5 and 6 over Larsson et al. in view of Juarrenz et al.

3. Applicant is arguing that :

a) Larsson does not describe a dye suitable of use in CD detection and

b) Juarrenz et al. teaches a fluorescence method and does not describe CD detection. Hence there is no motivation to combine references.

Examiner's response is as follows:

Examiner has used Larsson et al. for following teachings;

a) to teach detection of hybrid DNA

b) teaching a cationic DNA binding compound

c) use of CD as a detection technique

Larsson et al. teach cationic compound YOYO that binds to DNA but do not teach cationic compound of Formula I that binds to DNA.

Examiner is using Juarrenz et al. for teaching the cationic compound of Formula I. This compound of formula I taught by prior art inherently has all the properties that are being argued by applicant as being advantageous.

Particularly Juarrenz et al. in page 46, par 3 of introduction states "Meso-tetraphorphine (TMAP) is an outside DNA binder (with external self-stacking) and also binds by inclusion into branched DNA structures". So TMAP, a compound of formula I does not intercalate in DNA as does YOYO. Compound TMAP has an inherent property that it exhibits a CD spectra when bound to DNA. This is evidenced by Seokjoo Hong and Sungho Huh (2003) Bull. Korean Chem Soc. Vol. 24: no. 1 Fig. 3 on page 139 where

CD spectra of TMAP is shown at various molar ratios (r) of [porphyrin]/[DNA]. This reference is not being provided to applicant as it is cited in IDS submitted by applicant.

The rationale for combining references has been provided by Examiner in earlier office action and does not require express motivation See MPEP 2144.06 **Art**

**Recognized Equivalence for the Same Purpose.**

Hence the 103 rejection of claim 6 over Larsson et al. in view of Juarrenz et al. is being maintained.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 4, 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Larsson et al. (1994) J. Am. Chem. Soc. 116:8459-8465 further in view of Juarrenz

et al. (April 1996) J. of microscopy vol. 182, Pt. 1, pp. 46-49 (provided by Applicant in IDS).

Regarding claim 4, Larsson et al. teach : A method for detecting a hybrid nucleic acid (see line 1 abstract where double stranded DNA is taught. The teaching of double stranded DNA is being interpreted broadly to teach a hybrid nucleic acid—which by definition is double stranded) by use of a cationic dye compound (YOYO), comprising:

providing a cationic dye compound comprising a cation group and

a chromophore coupled to said cation group,

said chromophore having a heteropolycyclic structure containing a nitrogen atom (see fig. 1);

bringing a nucleic acid probe (see page 8459 par. 3 where YOYO is taught as a suitable probe for double stranded DNA—thus teaching bringing a nucleic acid probe) and a sample containing a target nucleic acid (double stranded DNA is taught as the target nucleic acid) into contact with each other under hybridization conditions to form a hybrid nucleic acid composed of said nucleic acid probe and said target nucleic acid (see page 8460 par. 3 where mixing of YOYO dye and DNA is taught to form the hybrid nucleic acid composed of said nucleic acid probe and said target nucleic acid;

binding said cationic dye compound onto said hybrid nucleic acid by adding the cationic dye compound before, during or after said hybridization(see abstract); and

measuring circular dichroism of said cationic dye compound bound onto said hybrid nucleic acid (see abstract where measurement of circular dichroism (CD) of said cationic dye compound bound onto said hybrid nucleic acid is taught) .

Regarding claim 7, Larsson et al. teach: The method further comprising:

immobilizing an analyte having said target nucleic acid or said nucleic acid probe onto a solid phase carrier to bring said analyte and said nucleic acid probe into contact with each other under hybridization conditions (see page 8459 par 3 where electrophoretic behavior of ds DNA in gels of fluorescently stained DNA is taught. By teaching gel (as solid phase) electrophoresis of DNA Larsson et al. teach immobilizing an analyte having said target nucleic acid or said nucleic acid probe onto a solid phase carrier to bring said analyte and said nucleic acid probe) YOYO---probe is bound to ds hybrid DNA thereby inherently meeting the requirements that they were put into contact with each other under hybridization conditions.

Regarding claim 4 Larsson et al. do not teach wherein said cationic dye compound is represented by the following general formula (I):  $X-(Y-Z)_n$

where n denotes 1 to 12,

X represents a chromophore having at least four pyrrole rings,

Y represents a connecting group or a direct bond between X and Z, and

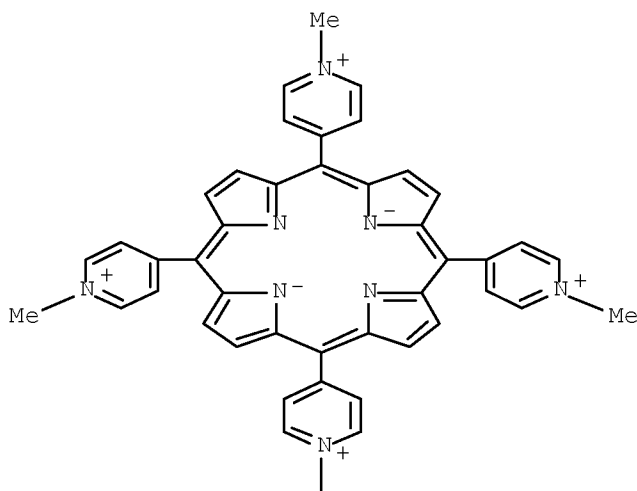
Z represents a cationic functional group, or a functional group whose property is convertible to a cationic property.

Regarding claims 4 and 6, Juarrenz et al. teach meso-tetra (4-N-methylpyridyl)porphine (T4MpyP) and meso-tetra (p-N-trimethylanilinium) porphine (TMAP) (see abstract) as a cationic dye compound is represented by the following general formula (I):  $X-(Y-Z)_n$ . A search done in STN for these chemicals provides following structure.

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L14 3 ANSWERS REGISTRY COPYRIGHT 2007 ACS on STN  
IN Pyridinium, 4,4',4'',4'''-(21H,23H-porphine-5,10,15,20-  
tetrayl)tetrakis[1-  
methyl-, bis(inner salt) (9CI)  
MF C44 H36 N8

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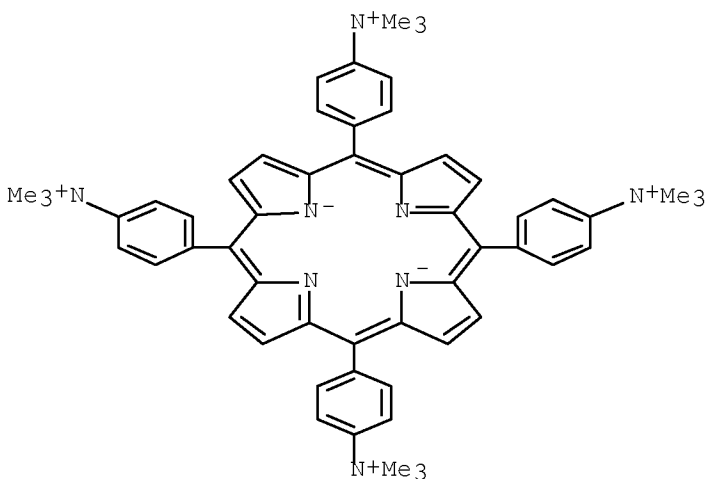


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Me

L14 3 ANSWERS REGISTRY COPYRIGHT 2007 ACS on STN  
IN Benzenaminium, 4,4',4'',4'''-(21H,23H-porphine-5,10,15,20-  
tetrayl)tetrakis[N,N,N-trimethyl-, bis(inner salt) (9CI)  
MF C56 H60 N8





Thus regarding claim 4, Juarrenz et al. teach wherein said cationic dye compound is represented by the following general formula (I): X-(Y-Z)<sub>n</sub>

Thus regarding claim 6, Juarrenz et al. teach wherein said chromophore is selected from the group consisting of porphyrin, porphyrin derivatives.

It would have been prima facie obvious to one of ordinary skill in the art to practice the method of Juarrenz et al. in the method of Larsson et al. at the time the invention was made.

Both YOYO taught by Larsson et al. and porphyrin derivatives taught by Juarrenz et al. are dyes that bind to DNA. TMAP is a porphyrin derivative compound of formula I. This compound has an inherent property of exhibiting CD spectra when bound to DNA. In addition Juarrenz et al teaches that this compound does not intercalate in DNA rather it's an outside binder. Thus art teaches two cationic compounds that bind to DNA. Larsson et al. teaches CD measurement from DNA bound to YOYO. Porphyrin derivatives taught by Juarrenz et al. are dyes that also bind DNA and have the inherent property of exhibiting CD spectra. Thus one of ordinary skill can readily use one or the

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other dye for binding DNA and measuring CD depending on the experimental design and the parameter they are interested in monitoring. See MPEP 2144.06 Art

Recognized Equivalence for the Same Purpose

### **SUBSTITUTING EQUIVALENTS KNOWN FOR THE SAME PURPOSE**

In order to rely on equivalence as a rationale supporting an obviousness rejection, the equivalency must be recognized in the prior art, and cannot be based on applicant's disclosure or the mere fact that the components at issue are functional or mechanical equivalents. An express suggestion to substitute one equivalent component or process for another is not necessary to render such substitution obvious. *In re Fout*, 675 F.2d 297, 213 USPQ 532 (CCPA 1982).

### ***Conclusion***

7. All claims under consideration 4, 6-7 are rejected over prior art.
8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SUCHIRA PANDE whose telephone number is (571)272-9052. The examiner can normally be reached on 8:30 am -5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Benzion can be reached on 571-272-0782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Suchira Pande  
Examiner  
Art Unit 1637

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/Teresa E Strzelecka/

Primary Examiner, Art Unit 1637

May 8, 2008